

REMARKS

The issues outstanding in the Office Action mailed March 16, 2004, are the objection to the Abstract and the rejections under 35 U.S.C. §112 and 103. The Examiner is thanked for indicating the withdrawal of the bulk of the formal objections and rejections (see item 2 of the Office Action). It is respectfully submitted that these issues are moot, in view of the following discussion.

Objection to the Abstract

In the Abstract, and for that matter in the claims, the term "mineral" has been amended to read "metal." Metal oxides are clearly supported in the present specification, for example, page 2, lines 20-24. It is respectfully submitted that this amendment clarifies the Abstract, and obviates the objection. Withdrawal thereof is respectfully requested.

Rejection Under 35 U.S.C. §112

Claims 1, 2 and 12-35 have been rejected under 35 U.S.C §112, second paragraph. Reconsideration of this rejection is respectfully requested.

It is again respectfully submitted that revision of the claims to recite that the oxide is a "metal" obviates any confusion. It is thus believed that a structural diagram is not necessary in view of the understanding of one of ordinary skill in the art and the disclosure in the specification.

With respect to claim 12, the version of the periodic table used to name the elements is exceptionally common and well understood in the art. Even to the extent it may be superceded by the table noted by the Examiner, the designations used in the claims are unambiguous and would not be misunderstood by one of ordinary skill in the art. However, in order to expedite prosecution, claim 12 has been amended in order to change the designations to usage preferred by the Examiner. The scope of the claim has not been changed by this amendment.

The Examiner is thanked for indicating other typographical corrections needed in the claims. These corrections having been made, withdrawal of all the rejections under 35 U.S.C

§112 is respectfully requested.

Rejection Under 35 U.S.C §103

Claims 1, 2 and 12-35 are rejected under 35 U.S.C §103 over any of Alberti, Dines, Calhoun, Wieserman or Corriu. Reconsideration of this rejection is again respectfully requested. Alberti disclose phosphate or phosphonate compounds in crystallized form, that is, compounds having clearly defined structural formulae $\text{Zr}(\text{O}_3\text{PCH}_2\text{SO}_3\text{H})_2$, $\text{Zr}(\text{O}_3\text{PCH}_2\text{CH}_2\text{SH})_2$ or $\text{Zr}(\text{O}_3\text{P}(\text{CH}_2)_3\text{SO}_3\text{H})_2$. It is evident that these crystalline materials have the structure which does *not* contain M-O-M', but only M-M'. For example, see the representation of the "simplified structure" in figure 1 in the left-hand column at page 93 of Dines, wherein zirconium, represented by a circle with a dot therein, is not bonded through an oxygen atom to another zirconium atom. Similarly, figures 1-3 of Alberti, found at pages 293 and 294 of the article, clearly show through computer representations or schematic drawings that zirconium, represented by a large dark circle, does not participate in any zirconium-oxygen-zirconium bonding structure, instead being only linked through oxygen to phosphorous atoms.

Moreover, the phosphonates of Corriu also appear to be of this structure, wherein M atoms are not bonded thorough oxygen to other M atoms. For example, note formula I at page 1, line 20 of Corriu, in which M is a tetravalent element from groups IVa or IVb of the periodic table. Similar compounds are disclosed, for example, as the first two compounds of table 3 of Alberti, et al., and thus clearly suggests that materials of Corriu are also compounds lacking M-O-M' groups.

Calhoun describes metallic salts of an acid containing phosphorous atom. As with Corriu, Alberti and Dines, Patentees' fail to disclose a material having M-O-M groups. It is evident from formula I and II, cited in the Office Action at page 4, that Patentees' compounds do not contain the "polyvalent metal", disclosed at line 30, bonded through oxygen to another polyvalent metal.

It is thus respectfully submitted that none of the above discussed references suggests a compound within the scope of the present claims, containing M-O-M' groups. However, the discussion at the bottom of page 3 of the Office Action appears to suggest that the only

difference between Alberti, Dines, or Corriu is the use of gel formation techniques. Indeed, as discussed above, this not the case. Since the Office Action fails to provide reasoning why modification of the materials of the references would be obvious, it is submitted that the rejection over these references fails, and should be withdrawn.

Wieserman discloses a material comprising a "substantially monomolecular layer of one or more phosphorous-containing organic acid molecules chemically bonded to the surface of a metal oxide/hydroxide particle," see column 3, lines 21-24 and 52-62. Patentees disclose that this material is obtained by grafting with a phosphonic or phosphinic acid. See, for example, column 7, lines 15-21. The result, as described at column 7, lines 41-48, and in figure 2, is a construct where the phosphorous containing acid group (-Y) is bonded to the metal oxide/hydroxide particle surface, and, thus, all M-O-P bonds are localized at the surface of the particle. Any M-O-M bonds which exist would be distributed throughout the particle bulk, as evidenced from the above-noted portion of the reference.

Thus, as set forth in the present specification wherein Weiserman is discussed, e.g., at page 1, lines 18-30 and at page 4, lines 24-29, the use of gel formation to produce the materials herein results in M-O-P and M-O-M' being distributed at the surface *and* through the interior of the final particle. Thus, the structure disclosed in Wieserman is physically different from the presently claimed materials, which are defined by their process of preparation (gel formation) and thus, inherently, have a distribution of groups as discussed. Indeed, Applicants have previously submitted a declaration under 37 C.F.R. 1.132, where it is shown that the Wieserman product is heterogeneous, as described in Patentees' specification, and not a homogenous product as claimed herein. An additional copy of that declaration is provided herewith, for the Examiner's convenience.

While it is argued, at page 3 of the Office Action, that "sol-gel processing is a conventional means of making solid state ceramic adsorbents and catalysts," there is no discussion of why it would be obvious to use such a technique in the processes of the references. Indeed, the Office Action does not even address the issue of whether the materials of the reference could be successfully synthesized using gel methods, and there is does not seem to be any suggestion whatsoever that gelification can be used so as to produce the reference products.

Indeed, in view of the declaration, which establishes that gelation produces a different material than that of Wieserman, it can be seen that the expectation of one of ordinary skill in the art; specifically, that the gel technique would not result in any difference, has been disproved. Thus, any case of *prima facie* obviousness which may be believed to exist has clearly been rebutted, and it is submitted that an insufficient case of motivation has been made. Withdrawal of this rejection is therefore also appropriate, and is respectfully requested.

The claims of the application are submitted to be in condition for allowance. However, if the Examiner has any questions or comments, he is cordially invited to telephone the undersigned at the number below.

Finally, it is respectfully submitted that, regardless of the purported obviousness of the use of a sol-gel to produce the reference materials, the disclosures of the reference in no way suggest production of a material such as that defined in new independent claim 36, in which starting materials other than those disclosed in the references are employed. Thus, the combination of references clearly completely fails to suggest the product of this claim, as well.

The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,



Harry B. Shubin, Reg. No. 32,004
Attorney/Agent for Applicant(s)

MILLEN, WHITE, ZELANO
& BRANIGAN, P.C.
Arlington Courthouse Plaza 1, Suite 1400
2200 Clarendon Boulevard
Arlington, Virginia 22201
Telephone: (703) 243-6333
Facsimile: (703) 243-6410

Attorney Docket No.: PET-1936
Date: June 16, 2004
HBS/jqs K:\PET\1936\Reply 6-14-04.doc